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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,315	07/23/2003	Francis James Kane JR.	10048-006	8385

29391 7590 02/27/2006

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EXAMINER	
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ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/625,315	KANE, FRANCIS JAMES	
	Examiner	Art Unit	
	Roberta Prendergast	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 10 November 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 23 July 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Examiner acknowledges the amendment to the specification dated 10/27/2005, wherein the previously missing reference characters are disclosed, and therefore the objection to the drawings is hereby withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 recites the limitation "...wherein blending further comprises trilinear filtering..." in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim. Claim 4 depends from claim 1, which does not include the limitation of blending. Amending claim 4 to read "...further comprises blending wherein blending further comprises trilinear filtering..." or amending claim 4 to depend from claim 2 would be sufficient to overcome this rejection.

Examiner acknowledges the amendment to claim 8 dated 11/11/2005 and therefore the 35 USC § 112 rejection of claim 8, and subsequently dependent claims 9-12, which depend from claim 8, is hereby withdrawn.

Examiner acknowledges the amendment to claim 10 dated 11/11/2005 and therefore the 35 USC § 112 rejection of claim 10 is hereby withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Chen, et al., "LOD-sprite technique for accelerated terrain rendering", *Proc. of Conference on Visualization '99: Celebrating Ten Years*, IEEE Visualization, IEEE Computer Society Press, Los Alamitos, CA, pages 291-298.

Referring to claim 1, Chen et al. teaches a method of providing multiple scaled versions of a representation of an object in a computer graphics system, providing a 3D computer graphic object (page 291, Fig. 2 shows a 3d object being provided to the method), rendering the 3D computer graphic object to a 2D texture map, and creating a set of sequentially varying scaled resolution versions of the 2D texture map representative of the 3D computer graphic object rendered to the 2D texture map at corresponding predetermined viewing distances (Fig. 2; page 291, section 1 Introduction, paragraphs 5-6; page 292, section 2.1, 5th paragraph; pages 292-293, section 3.1 Algorithm, i.e. a 2d texture map/frame is first rendered from the 3d object and then cached as an image sprite and subsequent lower-resolution frames are rendered by texture mapping the image sprite onto lower-resolution LOD representations of the 3d object).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4, 7, 13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al., "LOD-sprite technique for accelerated terrain rendering", *Proc. of Conference on Visualization '99: Celebrating Ten Years*, IEEE Visualization, IEEE Computer Society Press, Los Alamitos, CA, pages 291-298, as applied to claim 1, and further in view of Munshi et al. U.S. Patent No. 6469700.

Referring to claim 2, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1, but does not specifically teach blending at least two sequentially adjacent versions to provide an anti-aliased representation of the object at corresponding predetermined viewing distances.

Munshi et al. teaches this limitation (column 5, lines 30-36; columns 5-6, lines 41-41; column 7, lines 39-44, i.e. trilinear filtering is used to blend at least two sequentially adjacent versions to provide an anti-aliased representation of the object at corresponding predetermined viewing distances).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include blending

at least two sequentially adjacent versions to provide an anti-aliased representation of the object at a corresponding predetermined viewing distances, as taught by Munshi et al., thereby adding visual detail to synthetic images in computer graphics (column 5, lines 13-25).

Referring to claim 4, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1, but does not specifically teach wherein blending further comprises trilinear filtering.

Munshi et al. teaches wherein blending further comprises trilinear filtering (column 4, lines 15-26; columns 5-6, lines 41-41; column 7, lines 39-44).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include wherein blending further comprises trilinear filtering thereby adding visual detail to synthetic images in computer graphics (column 2, lines 58-65; column 5, lines 13-25).

Referring to claim 7, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1, but does not specifically teach applying at least one of the scaled resolution versions to a single polygon and rendering the polygon to a display device.

Munshi et al. teaches applying at least one of the scaled resolution versions to a single polygon (column 1, lines 62-65; column 5, lines 4-21, i.e. a LOD texture plane/mip map is applied to a 3d surface polygon or triangle during rendering); and rendering the polygon to a display device (column 5, lines 13-21; column 8, lines 40-56).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include applying at least one of the scaled resolution versions to a single polygon and rendering the polygon to a display device thereby adding visual detail to synthetic images in computer graphics (column 2, lines 58-65; column 5, lines 13-25).

Referring to claim 13, the rationale for claims 1 and 4 are incorporated herein, claim 13 recites the elements of claims 1 and 4 (i.e. the imposter is understood to be the 2D texture map of claim 1 and blending by utilizing trilinear filtering of the MIP maps provides an anti-aliased imposter) and therefore the same rejection applies.

Referring to claim 16, Chen et al. teaches the method of claim 1, but does not specifically teach a computer graphics system comprising a host computer, a computer graphics generator apparatus card comprising a rasterizer and a texture mapper, and a host interface for coupling the computer graphics generator apparatus card to the host computer.

Munshi et al. teaches a computer graphics system comprising: a host computer; the computer graphics generator apparatus card comprising a rasterizer (Fig. 1 (element 60); column 4, lines 37-45), and a texture mapper (Fig. 2 (element 120); column 4, lines 45-61); and a host interface for coupling the computer graphics generator apparatus card to the host computer (Figs. 1 and 2 (element 40); column 4, lines 26-61).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to implement the method of Chen et al. on a computer

graphics system, taught by Munshi et al., comprising a host computer, a computer graphics generator apparatus card comprising a rasterizer, a texture mapper, and a host interface for coupling the computer graphics generator apparatus card to the host computer thereby providing a computer graphics system capable of performing the accelerated rendering method of Chen.

Referring to claim 15, the rationale for claim 16 is incorporated herein, claim 15 recites the elements of claim 16 and therefore the same rejections apply.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al., as applied to claim 1 above, and further in view of Migdal et al. U.S. Patent No. 5760783.

Referring to claim 3, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1, but does not specifically teach wherein an updated representation of the object is provided when a viewing angle of the object changes or lighting on the object changes.

Migdal et al. teaches this limitation (Figs. 8A(elements 850 and 860) and B; columns 7-8, lines 62-5; column 8, lines 21-35; column 10, lines 16-65, i.e. providing an updated representation of the object when the field of view or eyepoint location changes by updating texel data in the clip map to track changes in field of view and/or eyepoint location).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include

providing an updated representation of the object when the field of view or eyepoint location changes thereby providing textured images that can be rendered efficiently at real-time display speeds even when complex and voluminous source data is used (columns 2-3, lines 60-4; column 8, lines 2-5; column 10, lines 55-65) because user's demand that new views be displayed in real-time (column 10, lines 24-29).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al., as applied to claim 1 above, and further in view of Wilde U.S. Patent No. 5986663.

Referring to claim 5, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1 but does not specifically teach rendering the 3D computer graphic object to a 2D texture map at a resolution greater than the resolution of the 3D computer graphic object.

Wilde teaches this limitation (column 8, lines 11-22 and 47-62, i.e. the original image is at a resolution of 256 by 256 texels, which is LOD2 and LOD0 is 1024 by 1024 texels, thus the 3D computer graphic object is rendered to a 2D texture map at a resolution greater than the resolution of the 3D computer graphic object, and is used for those polygons that are close to the viewer and therefore require the maximum amount of detail).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include wherein the original image is at a resolution of 256 by 256 texels, which is LOD2 and LOD0 is 1024 by 1024 texels, so that the 3D computer graphic object is rendered to a 2D texture

map at a resolution greater than the resolution of the 3D computer graphic object, and can used for those polygons that are close to the viewer and therefore require the maximum amount of detail, as taught by Wilde, thereby providing higher quality images while increasing speed, efficiency, and realism (Abstract; column 3, lines 15-40; column 4, lines 1-18).

Referring to claim 6, the rationale for claims 1 and 5 are incorporated herein, Chen et al., as modified by Wilde above, recites the method of claims 1 and 5 wherein rendering further comprises rendering the 3D computer graphic object to a 2D texture map at a resolution of 256 by 256 texels, see rationale for claim 5 above.

Claims 8, 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al., as applied to claim 1 above, and further in view of Murphy U.S. Patent No. 6038031.

Referring to claim 8, the rationale for claim 1 is incorporated herein, Chen et al. teaches the method of claim 1, but does not specifically teach wherein the step of rendering further comprises internally rendering, in a first pass, the 3D computer graphic object to a 2D texture map using the color values and alpha values of the 3D computer graphic object, and the color values of the 2D texture map; and internally re-rendering the 3D computer graphic object to a 2D texture map to overwrite the alpha values rendered in the first pass, with corrected alpha values.

Murphy teaches wherein the step of rendering further comprises: internally rendering, in a first pass, the 3D computer graphic object to a 2D texture map using the

color values and alpha values of the 3D computer graphic object, and the color values of the 2D texture map (column 2, lines 50-65; column 6, lines 1-32; column 8, lines 4-10; column 9, lines 20-45, 49-53, and 55-62, i.e. the step of bilinear filtering to smooth "blocky" edges within an LOD is understood to be a first rendering pass); and internally re-rendering the 3D computer graphic object to a 2D texture map to overwrite the alpha values rendered in the first pass, with corrected alpha values (column 3, lines 19-59; column 6, lines 32-60; column 8, lines 14-21; column 9, lines 34, 44-45, 53-54, and 61-64, i.e. the step of trilinear filtering to smooth "blocky" edges between different LOD is considered to be a re-rendering pass).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. to include the bilinear filtering step, as taught by Murphy, thereby eliminating a border effect caused by including some of the key color, which should not be plotted, in the pixels that are valid for plotting (column 4, lines 55-65); and the step of trilinear filtering to smooth "blocky" edges between different LOD, as taught by Murphy, thereby providing a method for blending capabilities with increased transparency levels without significantly increasing hardware cost and complexity thereby reducing blocky edge effects in order to smooth the transition between the source and destination pixels (column 5, lines 1-23; column 6, lines 55-60) and further allowing realistic rendering of translucent surfaces such as glass or water and atmospheric effects such as fog or smoke and depth effects (column 2, lines 32-50).

Referring to claim 9, the rationale for claim 8 is incorporated herein, Chen et al., as modified above, teaches the method of claim 8, but does not specifically teach wherein the method further comprises assigning an alpha value of zero (0) to the 2D texture map.

Murphy et al. teaches wherein the method further comprises assigning an alpha value of zero (0) to the 2D texture map during color testing when the color is a background or edge color (column 6, lines 3-19, i.e. it is understood that testing the color can result in every pixel of the 2D texture map being assigned an alpha value of zero (0) when the color is a background or edge color).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. by the teachings of Murphy et al. thereby eliminating any key color pixels and forcing the edge pixels to have an alpha value proportional to their distance from the body of the object thus reducing or eliminating the "blocky" edges (column 5, lines 14-23; column 6, lines 27-28 and 48-60).

Referring to claim 14, the rationale for claim 8 is incorporated herein, claim 14 recites the elements of claim 8 and therefore the same rejections apply.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al. in view of Murphy U.S. Patent No. 6038031 as applied to claim 8 above, and further in view of Duluk, Jr. et al. U.S. Patent No. 6476807.

Referring to claim 10, the rationale for claim 8 is incorporated herein, Chen et al., as modified above, teaches the method of claim 8, but does not specifically teach wherein the method further comprises selecting maximum color values of the initially rendered color values in the first pass and using, in the second pass, the maximum color values to overwrite the initially rendered color values.

Duluk, Jr. et al. teaches this limitation (column 9, lines 45-64, i.e. for color testing two values, max and min, are provided; columns 10-11, lines 54-21, i.e. a maximum alpha blending function ($C = \max(C_s,C_d)$) is provided under OpenGL wherein each of the four R, G, B, and A components of a source texel is blended with the corresponding component of a destination texel; column 14, lines 26-40, i.e. opaque geometry is rendered in a first pass and then transparent geometry is rendered in a second pass in spatial order resulting in more correct rendering; column 21, lines 25-31, alpha blending; column 27, lines 20-50, mip-mapping; columns 27-28, lines 61-19, i.e. alpha-blending is performed on pixels).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. with the teachings of Duluk, Jr. et al. thereby providing an efficient blending equation with reduced complexity using OpenGL® standards (column 34, lines 43-49).

Referring to claim 11, the rationale for claim 10 is incorporated herein, Chen et al., as modified by Duluk, Jr. et al. above, teaches the method of claim 10 wherein the maximum color value is selected according to the formula: C = MAX(Cs, Cd; where C represents the maximum color value drawn to each texel in the texture map, Cs

represents the color value of the 3D computer graphic object, Cd represents the color value of the 2D texture map, and the function MAX determines the maximum of Cs and Cd, see rationale for claim 10 above.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, et al. in view of Murphy U.S. Patent No. 6038031 as applied to claim 8 above, and further in view of Emberling et al. U.S. Patent No. 6246422.

Referring to claim 12, the rationale for claim 8 is incorporated herein, Chen et al., as modified above, teaches the method of claim 8 but does not specifically teach wherein the step of internally rendering, in a first pass, is performed according to the formula: C = As*Cs +(1-As)*Cd; where C represents the final color drawn to the 2D texture map, As represents the alpha value corresponding to the source 3D object, Cs represents the color value of the source 3D computer graphic object, and Cd represents the color value of the destination 2D texture map.

Emberling et al. teaches blending the interpolated color and the texture color using the alpha channel of texture: C = At*Ct +(1-At)*Cf (column 12, lines 28-41).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Chen et al. with the teachings of Emberling et al. thereby providing a four channel merging option that can be used for translucent texture effects and for assigning different values to the alpha components in the texture map using OpenGL notation (Emberling: column 11, lines 38-41; column 12, lines 38-41).

Response to Arguments

Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following Patents are cited to further show the state of the art with respect to level of detail (LOD) texture mapping.

Griffen et al. U. S. Patent No. 5880737

Toelle et al. U. S. Patent No. 5949428

Kajiya et al. U. S. Patent No. 5977977

Bishop et al. U. S. Patent No. 6424351

Kaufman et al. U. S. Patent No. 6674430

The following Non-Patent Literature is cited to further show the state of the art with respect to level of detail (LOD) texture mapping and updating changing views.

Maciel, et al., "Visual navigation of large environments using textured clusters", Proc. of 1995 Symposium on interactive 3D Graphics, ACM Press, New York, NY, pages 95-102 and 211.

Gernot, S., "Image-based object representation by layered impostors", Proc. of the ACM Symposium on Virtual Reality Software and Technology, VRST '98, ACM Press, New York, NY, pages 99-104.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberta Prendergast whose telephone number is (571) 272-7647. The examiner can normally be reached on M-F 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RP

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